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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/084,387	02/28/2002	Ryoso Masaki	381NP/50925	6274

7590

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EXAMINER

RO, BENTSU

ART UNIT

PAPER NUMBER

2837

DATE MAILED: 08/05/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/084,387

Applicant(s)

MASAKI ET AL.

Examiner

Bentsu Ro

Art Unit

2837

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1,2,4,6-8,11,12,17,20,21 and 23 is/are allowed.
- 6) ☒ Claim(s) 3,5,9,10,13 and 18 is/are rejected.
- 7) ☒ Claim(s) 14-16,19 and 22 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4. 6) ☐ Other: \_\_\_\_\_

## FIRST OFFICE ACTION

1. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.
2. The following informalities have been noted, correction is required:
  - Page 6, line 2, change "Fig. 2 is" to --Figs. 2(a) and 2(b) are--.
  - Page 12, line 19, change "a the" to --a-- (i.e. delete "the").
3. Claims 2, 3, 20 are objected to because of the following informalities:
  - Claim 2, line 12, the recitation "said plurality of voltage vector differences" lacks antecedent basis.
  - Claim 3, last two lines, the recitation "said detection phase of said current vector" lacks antecedent basis.
  - Claim 20, line 2, the recitation "said detection phase" lacks antecedent basis.

Appropriate correction is required.

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.
4. Claims 3, 9, 10, 5, 13, 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Krause US Patent No. 5,270,622** in view of **Deller US Patent No. 4,764,711**, or vice versa.

Regarding claim 3, Krause teaches :

- a motor controller 18, see Fig. 1;
- an brushless dc motor, which is a synchronous motor; this type of synchronous motor has been called as an "AC motor" by applicant, see applicant's Fig. 1, the synchronous motor 1 or AC motor 1;
- a 3 $\phi$  bridge circuit 26, which is same as "a power converter" of claim 3;
- a PWM signal generated by comparing a voltage command value with a carrier, see column 3, lines 27-32;

- Hall effect sensors 14.

Regarding claim 3, Krause does not teach a current detection unit and a detection phase decision unit for calculation a detected rotor position. However, a current detection unit and a detection phase decision unit for calculating a detected rotor position are taught by Deller.

Deller Fig. 2 clearly teaches :

- a current sensor 34, which is a current detection unit; it is noted that the current detection values in the current detection unit are always in synchronous with the carrier frequency of the PWM signal because the motor current is generated as a result of applied PWM voltages;
- a summing junction 60 which is a detection phase decision unit; and
- a position integrator 28 which is a position detection unit.

The function of detection phase decision unit reads onto Deller's Fig. 2 circuit as follows:

**the detection phase decision unit and the position detection unit of claim 3 (claim 3, lines 9-13):**

a detection phase decision unit for calculating a detection position

decided by said voltage

and said detected rotor position,

and a position detection unit

for detecting said rotor position

by using a component of said detection phase of said current vector.

**Deller's Fig. 2 teaching:**

the summing junction 60;  
the output of junction 60 is a motor position error, which is used as a feedback loop to calculate the rotor position ;

the  $V_m$  outputted from the power amplifier 30;

the approximate position on line 62 inside the position integrator 28;

the position integrator 28;

the output of the integrator 28 is a motor position;

the input to the integrator 28 includes (1)  $V_m$ , (2)  $L di/dt$ , and (3)  $iR$ ;  
the  $L di/dt$  is a "component" of said detection phase of said current vector.

In view of the foregoing, it would have been obvious to a skilled person in the art to use Deller's rotor position detection circuit in the Krause's brushless motor circuit to achieve the same subject matter as claimed.

Then, why one would use Deller's rotor position detection circuit instead of the Hall sensors (generally three Hall sensors) of Krause? The rotor position detection circuit of Deller, if used in the Krause's motor, will reduce the components of the motor structure, as a result, the size and the cost of the motor may also reduce.

Regarding claim 9, the current sensor 34 of Deller detects the current all the times, including a current at a point of time when the carrier reaches close to a center value.

Regarding claim 10, the Deller's summing junction 36 is a reference current vector calculation unit. The "detection phase component of a reference current vector for said voltage" reads onto the  $V_m$ ; and the "detection phase component of said current vector" reads onto the  $Ldi/dt$ . The summing junction 36 calculates the rotor position based on the difference of these two voltages  $V_m$  and  $Ldi/dt$ .

Claim 5 is claiming a first portion of claim 3 and claim 9, claim 13 is claiming a second portion of claim 3, discussion is omitted.

Regarding claim 18, Deller teaches  $di/dt$ , which is a current variation. The rotor position is determined based at least on the current variation.

5. The subject matters of claims 1, 2, 6-8, 4, 11, 20, 12, 21, 23, and 17 are allowable.
6. Claims 14, 15, 16, 19, and 22 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.
8. Any inquiry concerning this communication should be directed to Bentsu Ro at telephone number 703 308-3656.

July 28, 2003

*Bentsu Ro*  
Bentsu Ro  
Primary Examiner